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ABSTRACT

The National Household Education Survey (NHES) is a data collection system of the National Center for Education Statistics (NCES) designed to address a wide range of education-related issues. It is a telephone survey of the noninstitutionalized civilian population. This working paper presents information on the potential for undercoverage bias in estimates from the 1995 NHES. Estimates from the 1995 NHES are subject to bias because only households with telephones were sampled. Data from the 1992 October supplement to the Current Population Survey of the U.S. Census are used to evaluate the potential size of the bias of the estimates. The focus in the report is on the statistics for two separate populations: 0- to 2-year-olds who were sampled as part of the Early Childhood Program Participation (ECPP) component and civilian adults who were sampled for the Adult Education (AE) component. The analysis of undercoverage bias shows that the coverage biases for estimates of adult characteristics are not very large, but biases for 0- to 2-year-olds are somewhat larger, yet still relatively small. The coverage bias is small even though some of the differences in characteristics for persons living in telephone and nontelephone households are large. The undercoverage bias for subgroups in the NHES may be more of a problem. In this study, the undercoverage biases for characteristics of Black and Hispanic American 0- to 2-year-olds were generally larger than for all children. For adults, these undercoverage biases were not as large as for children. Overall, however, results support the use of the telephone survey methodology. An appendix presents three tables of study data. (Contains nine references.) (SLD)

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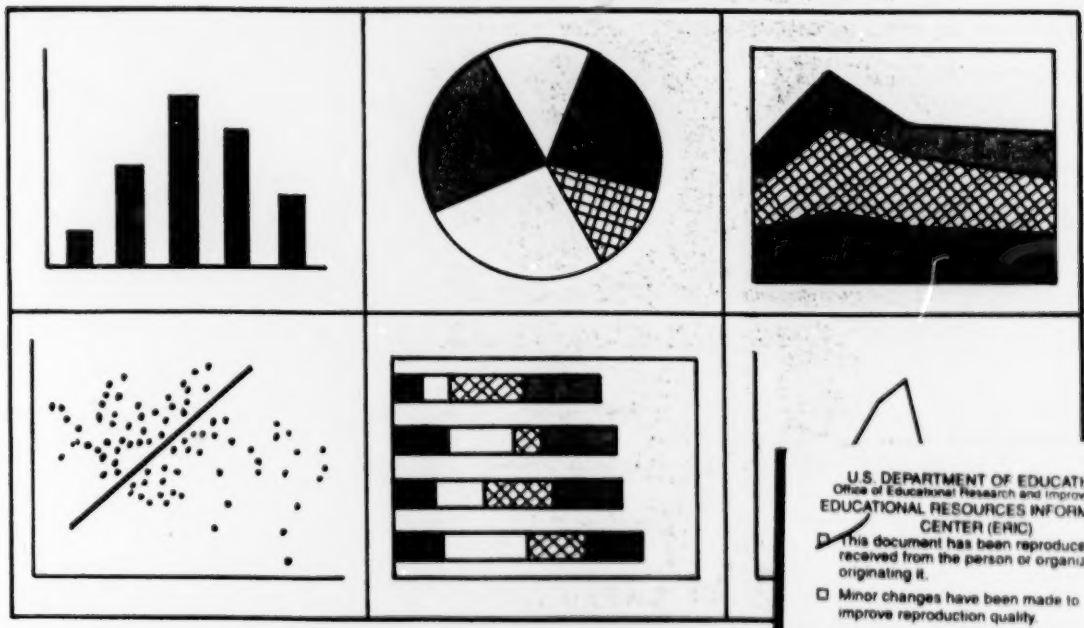

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Undercoverage Bias in Estimates of Characteristics of Adults and 0- to 2-Year-Olds in the 1995 National Household Education Survey (NHES:95)

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November 1996

Foreword

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November 1996

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OVERVIEW OF THE NATIONAL HOUSEHOLD EDUCATION SURVEY

The National Household Education Survey (NHES) is a data collection system of the National Center for Education Statistics (NCES), which has as its legislative mission the collection and publication of data on the condition of education in the Nation. The NHES is specifically designed to support this mission by providing information on those educational issues that are best addressed by contacting households rather than schools or other educational institutions. The NHES provides descriptive data on the educational activities of the U.S. population and offers policymakers, researchers, and educators a variety of statistics on the condition of education in the United States.

The NHES is a telephone survey of the noninstitutionalized civilian population of the U.S. Households are selected for the survey using random digit dialing (RDD) methods; and data are collected using computer-assisted telephone interviewing (CATI) procedures. Approximately 45,000 to 60,000 households are screened for each administration, and individuals within households who meet predetermined criteria are sampled for more detailed or extended interviews. The data are weighted to permit estimates of the entire population. The NHES survey for a given year typically consists of a Screener, which collects household composition and demographic data, and extended interviews on two substantive components addressing education-related topics. In order to assess data item reliability and inform future NHES surveys, each administration also includes a subsample of respondents for a reinterview.

The primary purpose of the NHES is to conduct repeated measurements of the same phenomena at different points in time. Throughout its history, the NHES has collected data in ways that permit estimates to be tracked across time. This includes repeating topical components on a rotating basis in order to provide comparative data across survey years. In addition, each administration of the NHES has benefited from experiences with previous cycles, resulting in enhancements to the survey procedures and content. Thus, while the survey affords the opportunity for tracking phenomena across time, it is also dynamic in addressing new issues and including conceptual and methodological refinements.

A new design feature of the NHES program implemented in the NHES:96 is the collection of demographic and educational information on members of all screened households, rather than just those households potentially eligible for a topical component. In addition, this expanded screening feature includes a brief set of questions on an issue of interest to education program administrators or

policymakers. The total Screener sample size is sufficient to produce state estimates of household characteristics for the NHES:96.

The NHES has been conducted in 1991, 1993, 1995, and 1996. Topics addressed by the NHES:91 were early childhood education and adult education. The NHES:93 collected information about school readiness and school safety and discipline. The 1991 components were repeated for the NHES:95, addressing early childhood program participation and adult education. Both components underwent substantial redesign to incorporate new issues and develop new measurement approaches. In the NHES:96, the topical components are parent/family involvement in education and civic involvement. The NHES:96 expanded screening feature includes a set of questions on public library use.

In addition to its topical components, the NHES system has also included a number of methodological investigations. These have resulted in technical reports and working papers covering diverse topics such as telephone undercoverage bias, proxy reporting, and sampling methods. This series of technical reports and working papers provides valuable information on ways of improving the NHES.

This working paper presents information on the potential for undercoverage bias in estimates from 1995 National Household Education Survey data. Readers may also wish to review other NHES:95 working papers: *Unit and Item Response Rates, Weighting, and Imputation Procedures in the 1995 National Household Education Survey* (Brick and Broene 1996), and *Design, Data Collection, Interview Timing, and Data Editing in the 1995 National Household Education Survey* (Collins et al. 1996), *The 1995 National Household Education Survey: Reinterview Results for the Adult Education Component* (Brick et al. 1996), and *Comparison of Estimates from the 1995 National Household Education Survey* (Collins et al. 1996). Comparable working papers are also being prepared for the NHES:96.

1995 NATIONAL HOUSEHOLD EDUCATION SURVEY
UNDERCOVERAGE BIAS IN ESTIMATES

Introduction

The estimates from the National Household Education Survey of 1995 (NHES:95) are subject to bias because only households with telephones were sampled. Data from the 1992 October supplement to the Current Population Survey (CPS) are used in this report to evaluate the potential size of the bias of the estimates. Since weighting adjustments are used in the NHES:95 with the goal of reducing this coverage bias, the findings in this report also provide an evaluation of the effectiveness of these adjustments.

The focus of this report is on the statistics for two separate populations: 0- to 2-year-olds who were sampled as a part of the Early Childhood Program Participation (ECPP) component and civilian adults who were sampled for the Adult Education (AE) component. Children from birth through 10 years old were sampled for the ECPP component, but previous research was already conducted for children aged 3 to 7 years using the same CPS data (Brick and Tubbs 1996). Thus, only the bias for statistics for children up to 2 years is included in this report.

This report continues research on telephone coverage bias in estimates from the NHES that began with the Field Test of 1989 (Brick, Burke, and West 1992). Other research was conducted for the NHES:91 (Brick 1992) and the NHES:93 (Brick and Tubbs 1996). The rationale for using the CPS data to estimate the potential bias in statistics from the NHES is the same as used in the previous reports, but the methods used have been somewhat modified based on the previous research.

Telephone Coverage and Bias

The NHES:95 was a random-digit-dial telephone survey and only included persons who lived in households with telephones. Approximately 6 percent of all persons live in households without telephones, according to data from the March 1992 CPS. The percentage of persons who live in households with telephones varies somewhat by characteristics of the populations considered. For example, while 95 percent of all adults (age 16 years and over) live in telephone households, only 87 percent of black adults and 88 percent of Hispanic adults live in telephone households, based on these CPS data. These differences in coverage rates by characteristics of the population is one of the factors that leads to biases in statistics based on data collected from persons in telephone households only.

The term bias has a specific technical definition in this context. Bias is the expected difference between the estimates from the survey and the actual population value. For example, if all telephone households were included in the survey and responded to the required interviews, the difference between the estimate from the survey and the actual population value (which includes the responses of persons living in nontelephone households) is the bias due to incomplete coverage. Since the NHES is based on a sample, the bias is defined as the expected or average value of this difference over all possible samples.

Coverage bias, the bias due to failure to include all persons in the sample, can be substantial when two conditions hold. First, the differences between the characteristics in covered population and the uncovered population must be relatively large. For example, consider estimating the percentage of persons enrolled in a given type of program. If the percentage enrolled is nearly identical in both the covered and uncovered population, then the bias for the estimate will be negligible.

Second, the proportion of the population that is not covered by the survey must be large compared to the size of the estimates. If only 2 percent of the population is not covered, estimates of totals that comprise 20 or 30 percent of the population will not be greatly affected, even if the differences in the characteristics between the covered and uncovered populations are relatively large. It is important to realize that this condition requires the proportion uncovered must be large *relative* to the size of the estimates. If the estimate is for a small domain or subgroup, then even a small undercoverage problem can result in important biases if the differences between the covered and uncovered populations are large. Statistics for dropouts from high school, a small subgroup, suffered from this problem (Brick, Burke, and West 1992).

The percentage of 0- to 2-year-olds[1] who live in nontelephone households is estimated to be 10.9 percent using the October 1992 CPS. This percentage is somewhat greater than the undercoverage for the other children in the ECPP component of the NHES:95 (for 3- to 7-year-olds Brick and Tubbs (1996) reported undercoverage at 9.5 percent). For adults eligible for the AE component of the NHES:95 (civilians who are 16 years old or older and not currently enrolled in elementary or secondary school), 5.6 percent lived in nontelephone households according to the October 1992 CPS. These coverage rates

[1] Telephone status is not actually obtained in the October CPS interviews. However, it is asked of the households in the CPS sample in July and November. For this report, the Census Bureau obtained the data on telephone status from these months and placed it on the October 1992 file, when the same household was in the sample at one of these other times. The records without telephone status, 8.5 percent of the 0- to 2-year-olds and 6 percent of adults, were eliminated from these analyses.

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suggest that coverage bias could be a more significant problem for the ECPP component of the NHES:95 than for the AE component. Before concluding this, the differences in the characteristics of the covered and uncovered populations must be examined for the two populations.

The bias of an estimate can be expressed mathematically to show the relationships between the bias and the two factors discussed above. The bias is given by

$$Bias(\hat{y}_t) = P_n \{E(\hat{y}_t - \hat{y}_n)\} \quad (1)$$

where $\hat{y}_t$ is the estimated characteristic based on the telephone households only, P_n is the proportion of nontelephone households, $\hat{y}_n$ is the estimated characteristic based on the nontelephone households, and E is the expectation operator for averaging over all possible samples. Estimates of the uncovered proportion of the population for the ECPP and AE components were given above. In the next section, the differences in the characteristics and estimates of the bias due to undercoverage are presented.

Estimated Differences Between Telephone and Nontelephone Households and Coverage Bias

The differences in the characteristics of persons in telephone and nontelephone households has been explored for a number of topics by different authors. Thornberry and Massey (1988) assessed estimates of health characteristics and found many health and health-related characteristics of persons in nontelephone households were significantly different from those of persons in telephone households. Brick, Burke, and West (1992), Brick (1992) and Brick and Tubbs (1996) studied a variety of estimates for education statistics. They found the differences between persons in telephone and nontelephone households for enrollment statistics were typically smaller than those reported by Thornberry and Massey. However, for some statistics such as those for high school dropouts, the differences were very large. In general, these studies have shown that having a telephone is highly related to socioeconomic status and lifestyles (Smith 1990).

The adult and child supplements to the October 1992 CPS were used to examine the extent of the differences in the characteristics of persons in telephone and nontelephone households. These supplements are the most recent data sources containing data relevant to the ECPP and AE components of the NHES:95 that are large enough to provide reliable estimates and identify telephone and nontelephone households. The items included in the supplement for 0- to 2-year-olds is rather limited, only containing

items about care arrangements and disabilities. For the adults, a number of items about participation in adult education activities are available.

Percentage distributions for characteristics for each of the two populations were tabulated from the October 1992 CPS supplements. Table 1 is the tabulation for the population of children aged 0 to 2 years old and table 2 is for adults. The tabulation for adults was limited to those adults eligible for the AE component of the NHES:95, civilians who are 16 years old or older and not currently enrolled in elementary or secondary school. The first three columns of each table show the estimated percentage distributions for persons in telephone households, persons in nontelephone households, and persons in all households[2] . The fourth column in the tables is the estimated coverage bias, the difference between the estimate for persons in telephone households and the estimate for persons in all households. It is the algebraic equivalent of the bias given by equation (1).

Since the number of characteristics of interest to the ECPP on the CPS supplement is limited, table 1 includes the percentage distributions for all 0- to 2-year-old children; for Hispanic children; for black, nonHispanic children; and for nonblack, nonHispanic children. The first rows of table 1 are the care arrangements for the children and the last rows are disabling conditions (specific disabling conditions were also examined but the number of children with each condition was so small that the estimates were not useful for this purpose).

The coverage bias estimates reveal some important biases for statistics based only on telephone households. Focusing attention on estimates that are larger than 2 percent (excluding the other type of care arrangement characteristic), the absolute value of the coverage bias for either all children or one of the race/ethnicity subgroups is greater than 0.5 percent for every item and for black children it is often greater than 1 percent. Altogether, 9 of the 20 estimates larger than 2 percent have a coverage bias greater than 0.5 percent. The largest coverage bias is -5.6 percent for estimates of black children who have no nonparental care arrangements. Only 48.1 percent of black children who live in telephone households have no nonparental care arrangements, but 70.4 percent of those in nontelephone households have no nonparental care arrangements. This large difference in characteristics combined with the high undercoverage rate for black 0- to 2-year-olds (about 25 percent of black children are in nontelephone households) leads to the bias of over 5 percent.

Table 2 presents estimates from the CPS using the definition of adults eligible for the NHES:95 AE interview. The first five sets of items of the table include an assortment of characteristics of

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[2] The classification of a household by telephone status was based on the response to the item "Is there a telephone in this house/apartment?"

adults captured in the supplement while the remaining items are measures of participation in adult education. Table 3 contains estimates of the adult education participation items separately by race and ethnicity.

The estimates in table 2 show that while the characteristics of adults living in telephone and nontelephone households may be very different, the resulting biases are generally small because the undercoverage rates are relatively low. Thus, even though adults in telephone households were twice as likely as those in nontelephone households to have been involved in adult education activities in the last year (24.8 percent and 11.8 percent, respectively), the bias in the estimate due to undercoverage for this statistic is 0.6 percent. Only 5 of the 36 statistics in the table have estimated biases greater than 0.5 percent. Even the biases for smaller subgroups with higher undercoverage rates in table 3 are generally small, with none of the estimated bias larger than 1.0 percent.

Statistical Adjustments of the Estimates

Due to the potential biases due to undercoverage, the standard practice in the NHES is to make statistical adjustments of survey weights to compensate, to the extent possible, for undercoverage. The NHES adjustments that are specifically developed to compensate for the undercoverage are raking or poststratification to known control totals that contain counts of persons living in both telephone and nontelephone households. The goal of these adjustments is to make the estimates from the survey consistent with known totals, to partially correct for undercoverage bias, and to reduce the variance of the estimates.

For the ECPP component of the NHES:95, three dimensions of raking were used. The first dimension was a combination of race/ethnicity and household income (less than $10,000 or not). The second dimension was Census region and urbanicity (urban or rural). The third dimension was whether or not the home was owned/other or rented and age of the child (single year of age). For the AE component, four dimensions of raking were used: race/ethnicity and household income, age category (for 16- to 19-year-olds these were single years of age; for adults 20 and older these were 20-29, 30-49, and 50 and older) and gender, Census region and urbanicity, and home ownership (owned/other, rented).

In the previous research on coverage bias in the NHES, the average raking adjustment factors applied in the NHES were used to adjust the estimates from telephone households derived from the CPS to

produce a modified weight. This modified weight was used to make estimates and compared to the estimates from all households to determine if the coverage bias was reduced due to the adjustment.

For this study, a slightly different procedure is used to produce adjusted weights that can be applied to the telephone households from the CPS to form estimates of all persons. Control totals of the number of persons in both telephone and nontelephone households were first produced from the CPS file separately for both 0- to 2-year-olds and adults eligible for the AE interview. The weights for the CPS respondents from telephone households were then raked to these control totals to produce adjusted weights that summed to the total number of persons in both telephone and nontelephone households. The responses from persons in telephone households are then used with these adjusted weights to produce adjusted estimates. The adjusted estimates can then be compared to the estimates from all persons in the CPS to assess the resulting coverage bias and this should be very similar to the coverage bias found in the NHES estimates. By comparing the coverage bias of the unadjusted estimates from telephone households to the adjusted estimates it is also possible to assess the effectiveness of the raking adjustment. Since this approach is more consistent with the methods used to produce the NHES:95 weights, it is an improvement over the use of the average raking adjustment method used in the previous research.

For the CPS respondents corresponding to the ECPP component, the control totals for the adjustment process were the same three dimensions as used in the NHES:95, with one exception. The second dimension was Census region alone without urbanicity, since urbanicity was not on the CPS file. For the CPS respondents corresponding to the AE component, only three dimensions were used in the raking. The first two dimensions of raking were exactly the same as used in the AE component. The third dimension was Census region and home ownership. In other words, urbanicity was dropped and region and home ownership were combined into one dimension. The loss of urbanicity from the raking process should have little effect on the bias estimates because this variable was added in the NHES:95 primarily to account for coverage differences due to using a list-assisted method of random digit dialing. There are no good methods to evaluate the impact of dropping urbanicity, but it is likely that the estimates from this evaluation will not underestimate the bias.

Estimates of Coverage Bias After Adjustments

The adjusted weights were applied to the observations from the respondents in telephone households to produce the adjusted estimates shown in the next to last column in tables 1 and 2. The estimated bias in these statistics is given in the last column of these tables. The bias is the difference between the adjusted estimate and the estimate from all households. As before, a negative coverage bias

indicates that the estimate is smaller than the estimate based on all households.

Focusing attention on the nine estimates in table 1 that have a coverage bias from telephone households greater than 0.5 percent is useful because these are the statistics that suffer most from coverage bias. The bias of the adjusted estimate is less than or equal to the bias from the unadjusted estimate for all of these estimates. For seven of these statistics (all but for the estimate of care by a nonrelative for blacks and for the estimate of no disabling conditions for blacks) the bias of the adjusted estimate is at least 0.4 percent less than the bias of the unadjusted estimate (this ranges from 20 to 60 percent of the bias). The largest coverage bias is still for black children with no nonparental care arrangement, but the bias of the adjusted estimate is only -3.7 percent rather than the unadjusted bias estimate of -5.6 percent.

For two statistics, the bias from the unadjusted estimate was 0.5 percent or less, but the bias from the adjusted estimate was greater than 0.5 percent (care by a nonrelative for Hispanics and no nonparental care for Hispanics). For these two statistics, the raking adjustment added to the bias of the estimate rather than reducing it. As a result, 6 of the statistics estimated using the adjusted weights have coverage biases greater than 0.5 percent, as compared to the 9 statistics that had a coverage bias of this size based on the unadjusted estimates.

In general, the raking adjustments were effective in reducing the coverage bias of the estimates. The largest biases were generally smaller after the raking. Only a few of the estimates had bias estimates that were greater after the raking adjustment. However, the improvement was not uniform. For small estimates (2 percent or less) the raking adjustment had little benefit. This might have been expected, since the biases of these estimates before and after raking were all small. Little benefit could be expected from the adjustment in these circumstances. One subgroup for whom statistics were not improved by the raking adjustment was Hispanic children. The biases of the adjusted estimates for Hispanic children were as large or larger than the estimates before adjusting for all the estimates except for care by a relative.

The results for estimates of coverage bias for adults in table 2 are similar to the those for the 0- to 2-year-olds. All five of the estimates with an unadjusted telephone coverage bias of greater than 0.5 percent have adjusted biases that are equal to or less than the unadjusted bias. The reductions of some of the biases due to the raking are substantial, ranging up to about 50 percent of the size of the bias. None of the estimates with unadjusted coverage bias estimates of 0.5 percent or less have adjusted biases of greater than 0.5 percent. The same conclusions also apply to the estimates for subgroups defined by race and ethnicity shown in table 3.

The effectiveness of the raking adjustments in reducing the coverage bias for adults seems to be somewhat more uniform than that for 0- to 2-year-olds. The largest biases are reduced and no large increases in coverage bias are observed. No increases in biases are found for any of the race/ethnicity subgroups. As seen in the estimates for 0- to 2-year-old children, the biases associated with small estimates (less than 2 percent) are not generally reduced by the raking adjustment.

These findings are consistent with the research on the coverage bias in estimates for children for NHES:93. For the statistics computed for the 1993 study, the adjustments were somewhat effective in reducing bias, but the results were not consistent for all statistics. As in the previous research, the biases for race/ethnicity subgroups were larger than those across the total population. No previous research on the coverage bias in adult participation in education is available for comparison.

Conclusions

The analysis of undercoverage bias shows that the coverage biases for estimates of adult characteristics are not very large, while for 0- to 2-year-olds the biases are somewhat larger, but still relatively small. The coverage bias is small even though some of the differences in characteristics for persons living in telephone and nontelephone households are large. Once the weights for the telephone households are raked using variables correlated with the presence of a telephone in the household, the adjusted estimates are typically subject to less bias. In particular, estimates with larger coverage biases are nearly always either reduced or unaffected by the raking adjustment and the small biases associated with the rest of the items are rarely inflated.

The undercoverage bias for subgroups in the NHES may be more problematic. In this research, the coverage biases for estimates of characteristics of black 0- to 2-year-olds (and Hispanic 0- to 2-year-olds to a lesser extent) were generally larger than for all children. The coverage bias is larger for estimates from these subgroups because a larger proportion of persons in these subgroups live in nontelephone households. For adults corresponding to the AE component of the NHES:95, the coverage biases for blacks and Hispanics were not as large as for the children. This is due to the fact that the proportion of children in nontelephone households is nearly twice that of adults.

No specific rule can handle all the subgroups that may be considered by analysts of the NHES:95, but some guidelines are possible. When dealing with a small subgroup that is likely to be differentially covered, analysts need to account for both sampling errors and nonsampling errors. For example, estimates from the NHES for a poorly-covered subgroup such as black children might be

approached differently than analysis of all children. Analysts might use methods that recognize the estimates are subject to some coverage bias by only reporting differences that are both statistically significant and large enough to be important in the presence of moderate coverage bias. The coverage bias can be roughly computed using equation (1) and speculating on the differences between the telephone and nontelephone populations. Therefore, it is recommended that estimated differences between poorly-covered and well-covered groups (such as black and nonblack children) be considered substantively important only if the differences are larger than both sampling error and potential coverage bias error.

The findings of these and the previous studies of undercoverage bias in the NHES have uniformly shown that telephone data collection is a very cost-effective survey procedure for the populations studied in NHES. The telephone survey approach provides many more observations than would be possible for an in-person interview at the same cost and the added biases in the estimates due to not sampling nontelephone households are generally small. This feature is especially true for rare subgroups in which screening households in person can be prohibitively expensive.

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Appendix

Tables 1 - 3

Table 1.--Estimated percentage of 0- to 2-year-olds by telephone status, estimated coverage bias, and adjusted coverage bias

Characteristic	Telephone households	Non-telephone households	All households	Coverage bias	Adjusted telephone households	Adjusted coverage bias
Care arrangements						
Care by a relative						
All	13.7	13.5	13.7	0.0	13.6	-0.1
Hispanic	13.4	10.8	12.9	0.5	12.6	-0.3
Black, nonHispanic	20.5	17.0	19.6	0.9	19.4	-0.2
Nonblack, nonHispanic	12.5	11.6	12.4	0.1	12.4	-0.1
Care by a nonrelative						
All	12.1	6.1	11.5	0.6	11.7	0.2
Hispanic	4.9	6.7	5.2	-0.4	4.6	-0.7
Black, nonHispanic	8.8	2.9	7.3	1.5	8.6	1.3
Nonblack, nonHispanic	13.8	8.7	13.4	0.3	13.6	0.1
Day-care, nursery, preK or Head Start						
All	12.6	6.2	11.9	0.7	11.8	-0.1
Hispanic	6.6	7.0	6.7	-0.1	6.4	-0.4
Black, nonHispanic	14.0	5.7	11.9	2.1	13.3	1.3
Nonblack, nonHispanic	13.2	6.2	12.7	0.4	12.4	-0.3
Some other type of care						
All	1.4	0.5	1.3	0.1	1.3	0.0
Hispanic	0.7	0.0	0.5	0.1	0.6	0.1
Black, nonHispanic	1.4	0.8	1.2	0.1	1.3	0.0
Nonblack, nonHispanic	1.6	0.4	1.5	0.1	1.5	0.0
No nonparental care						
All	55.1	69.9	56.7	-1.6	56.4	-0.3
Hispanic	66.7	69.1	67.2	-0.5	68.5	1.3
Black, nonHispanic	48.1	70.4	53.7	-5.6	50.0	-3.7
Nonblack, nonHispanic	54.7	69.7	55.6	-0.9	55.9	0.2
Disabling conditions						
No disabling conditions						
All	93.0	93.3	93.0	0.0	93.0	0.0
Hispanic	91.0	90.8	91.0	0.0	91.3	0.4
Black, nonHispanic	91.4	96.5	92.7	-1.3	91.4	-1.3
Nonblack, nonHispanic	93.5	91.7	93.4	0.1	93.6	0.2

SOURCE: Special tabulations from the October 1992 Current Population Survey (CPS).

Table 2.--Estimated percentage of adults by telephone status, estimated coverage bias, and adjusted coverage bias

Characteristic	Telephone households	Non-telephone households	All house-holds	Coverage bias	Adjusted telephone households	Adjusted coverage bias
Highest grade attended						
less than 12th	17.2	40.8	18.6	-1.4	17.9	-0.7
12th grade	36.6	36.7	36.6	0.0	36.5	-0.1
1 or 2 years college	18.2	9.8	17.7	0.5	18.0	0.3
3-4 years of college	15.0	3.4	14.5	0.5	14.7	0.2
more than 4 years of college	7.6	1.2	7.3	0.3	7.4	0.1
Persons aged 15 to 24 years						
High school graduate	88.1	53.7	85.4	2.7	87.6	2.2
Complete high school by equivalency test	4.8	8.7	5.1	-0.3	4.9	-0.2
Speak language other than English at home	13.5	19.6	14.0	-0.5	14.0	0.0
and do not speak English well	19.4	39.8	21.6	-2.2	20.1	-1.5
Ever had condition affecting ability to learn	3.2	3.3	3.2	0.0	3.5	0.3
Of those in college, enrolled full-time	65.1	69.7	65.2	-0.1	65.5	0.3
Now taking bus., voc., tech, trade, corres. courses	2.3	1.8	2.2	0.1	2.3	0.1
Reported for person						
Self	52.6	60.8	53.0	-0.4	52.8	-0.2
Parent	7.7	4.2	7.6	0.1	7.8	0.2
Spouse	23.8	13.9	23.3	0.5	23.4	0.1
Other relative	5.6	7.3	5.7	-0.1	5.6	-0.1
Nonrelative	2.7	6.4	2.9	-0.2	2.8	-0.1
Involved in adult education activity in last year						
Any activity	24.8	11.8	24.2	0.6	24.8	0.6
Any activity, excluding full-time college	20.0	9.9	19.6	0.4	19.9	0.3
Any activity, excluding college	17.6	8.1	17.2	0.4	17.5	0.3
Enrolled full-time in the last year	6.1	4.4	6.0	0.1	6.3	0.3
In elem or high school program	12.8	13.5	12.8	0.0	12.7	-0.1
In associated degree program	17.9	21.7	18.1	-0.2	18.0	-0.1
In bachelor's or advanced program	60.5	31.2	59.5	1.0	60.2	0.7
In vocation or occupational program	14.2	26.8	14.7	-0.5	14.4	-0.3
In literacy or ABE program	0.9	5.1	1.1	-0.2	1.0	-0.1
In ESL program	1.0	2.1	1.0	0.0	1.1	0.1
In other program	4.8	7.0	4.8	0.0	4.8	0.0
Enrolled part-time in college in last year	3.9	1.8	3.8	0.1	3.9	0.1

Table 2.--Estimated percentage of adults by telephone status, estimated coverage bias, and adjusted coverage bias--Continued

Characteristic	Telephone households	Non-telephone households	All house-holds	Coverage bias	Adjusted telephone households	Adjusted coverage bias
Involved in other adult ed in last year						
In other continuing ed or noncredit program	6.2	2.1	6.0	0.2	6.1	0.1
In mail, tv, radio or newspaper courses	0.8	0.4	0.8	0.0	0.8	0.0
In private instruction	0.9	0.4	0.9	0.0	0.9	0.0
In program by employer, union, or comm grp.	10.8	3.5	10.5	0.3	10.7	0.2
In basic math, or English	0.6	1.0	0.6	0.0	0.6	0.0
In ESL	0.5	0.7	0.5	0.0	0.5	0.0
In other organized activity	1.6	0.8	1.6	0.0	1.6	0.0

NOTE: Includes civilian, noninstitutionalized adults 16 years of age and older not enrolled in elementary or secondary school.

SOURCE: Special tabulations from the October 1992 Current Population Survey.

Table 3.--Estimated percentage of persons by telephone status and estimated coverage bias for adults, by race and ethnicity

Characteristic	Telephone households	Non-telephone households	All house-holds	Coverage bias	Adjusted telephone house-holds	Adjusted coverage bias
Involved in adult education activity in last year						
All adults						
Any activity	24.8	11.8	24.2	0.6	24.8	0.6
Any activity, excluding full-time college	20.0	9.9	19.6	0.4	19.9	0.3
Any activity, excluding college	17.6	8.1	17.2	0.4	17.5	0.3
Hispanic adults						
Any activity	20.2	11.5	19.2	1.0	20.0	0.8
Any activity, excluding full-time college	16.9	10.5	16.2	0.7	16.7	0.6
Any activity, excluding college	13.8	8.6	13.2	0.6	13.6	0.4
Black, nonHispanic adults						
Any activity	19.3	11.2	18.3	1.0	19.1	0.8
Any activity, excluding full-time college	14.5	8.7	13.8	0.7	14.3	0.5
Any activity, excluding college	12.4	6.4	11.6	0.7	12.2	0.5
Nonblack, nonHispanic adults						
Any activity	25.9	12.3	25.4	0.4	26.0	0.5
Any activity, excluding full-time college	21.0	10.3	20.7	0.3	21.0	0.3
Any activity, excluding college	18.6	8.9	18.3	0.3	18.6	0.3
Involved in other adult ed in last year						
All adults						
In other continuing ed or noncredit program	6.2	2.1	6.0	0.2	6.1	0.1
In mail, tv, radio or newspaper courses	0.8	0.4	0.8	0.0	0.8	0.0
In private instruction	0.9	0.4	0.9	0.0	0.9	0.0
In program by employer, union, or comm grp.	10.8	3.5	10.5	0.3	10.7	0.2
In basic math, or English	0.6	1.0	0.6	0.0	0.6	0.0
In ESL	0.5	0.7	0.5	0.0	0.5	0.0
In other organized activity	1.6	0.8	1.6	0.0	1.6	0.0
Hispanic adults						
In other continuing ed or noncredit program	3.7	1.3	3.5	0.3	3.6	0.1
In mail, tv, radio or newspaper courses	0.4	0.2	0.4	0.0	0.4	0.0
In private instruction	0.8	1.0	0.8	0.0	0.8	0.0
In program by employer, union, or comm grp.	5.7	2.0	5.3	0.4	5.5	0.2
In basic math, or English	1.4	1.4	1.4	0.0	1.4	0.0
In ESL	3.5	3.3	3.5	0.0	3.7	0.1
In other organized activity	1.4	0.6	1.3	0.1	1.3	0.1

Table 3.--Estimated percentage of persons by telephone status and estimated coverage bias for adults, by race and ethnicity--Continued

Characteristic	Telephone households	Non-telephone households	All house-holds	Coverage bias	Adjusted telephone house-holds	Adjusted coverage bias
Black, nonHispanic adults						
In other continuing ed or noncredit program	3.6	2.3	3.5	0.2	3.6	0.1
In mail, tv, radio or newspaper courses	0.5	0.5	0.5	0.0	0.5	0.0
In private instruction	0.6	0.3	0.6	0.0	0.6	0.0
In program by employer, union, or comm grp.	7.9	1.9	7.1	0.7	7.6	0.4
In basic math, or English	0.9	0.9	0.9	0.0	0.9	0.1
In ESL	0.2	0.0	0.2	0.0	0.2	0.0
In other organized activity	1.2	1.3	1.2	0.0	1.2	0.0
Nonblack, nonHispanic adults						
In other continuing ed or noncredit program	6.7	2.4	6.6	0.1	6.7	0.1
In mail, tv, radio or newspaper courses	0.8	0.5	0.8	0.0	0.8	0.0
In private instruction	0.9	0.3	0.9	0.0	0.9	0.0
In program by employer, union, or comm grp.	11.6	4.9	11.4	0.2	11.6	0.2
In basic math, or English	0.4	0.9	0.5	0.0	0.5	0.0
In ESL	0.3	0.2	0.3	0.0	0.3	0.0
In other organized activity	1.7	0.6	1.6	0.0	1.7	0.0

NOTE: Includes civilian, noninstitutionalized adults 16 years of age and older not enrolled in elementary or secondary school.

SOURCE: Special tabulations from the 1992 Current Population Survey.

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